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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/603,257	06/26/2003	Yeu Wen Lee	ONS00461	3696

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EXAMINER

STAICOVICI, STEFAN

ART UNIT	PAPER NUMBER
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1732

DATE MAILED: 04/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/603,257

Applicant(s)

LEE ET AL.

Examiner

Stefan Staicovici

Art Unit

1732

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 and 21-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16, 21-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicants' amendment filed January 30, 2006 has been entered. Claims 1-16 and 21-24 are pending in the instant application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-6, 9-10 and 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claims 1 and 9, the newly added limitation of a pin "reversibly coupled" is unclear as to what Applicants are referring by "reversibly." It is noted that for the purpose of examination, "reversibly coupled" has been interpreted to mean "removable." Further clarification is required.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re*

Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1-16 and 21-24 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of U.S. Patent No. 6,835,580 in view of JP 2001-230520 and Takahashi *et al.* US Patent No. 5,766,972).

Claims 1-20 of U.S. Patent No. 6,835,580 teach the basic claimed process including, attaching (bonding) an electronic chip having a bond pad on an outer surface to a lead-frame structure, attaching a conductive stud to said bond pad, encapsulating said electronic chip, forming an opening in the upper surface to expose the conductive stud, forming a barrier layer on the conductive stud and attaching a solder bump to the barrier layer.

Regarding claims 1-2, 7, 9, 21 and 24, Claims 1-20 of U.S. Patent No. 6,835,580 do not teach that said mold has a blocking device, such as a pin, that contacts said conductive bump and that upon injection molding openings are formed in the encapsulating material. JP 2001-230520 teaches an injection molding process for making a plurality of openings and through-holes (recessed openings) at selected locations of a resulting molded article by using a mold having a plurality of protrusions (11) and pins (12) (see Abstract and, Figures 1b and 1c). Takahashi *et al.* ('972) teach a process for encapsulating a semiconductor device including, attaching (bonding) conductive bumps (30a) using bonding pads (31) to a chip structure (30) to form a

semiconductor assembly (DCA), placing said DCA device into a mold cavity such that the top surface said conductive bumps (30a) are flush with said mold surface, applying pressure to maintain full contact at the interface between said mold and said conductive bumps (30a), injection molding a resin material to encapsulate said DCA device and also form openings where said conductive bumps are present in order for solder balls (30b) to be attached (see col. 8, line 59 through col. 9, line 48 and Figures 8-11). Therefore, in view of the teachings of Takahashi *et al.* ('972) showing a desirability to form openings where said conductive bumps are present, it would have been obvious for one of ordinary skill in the art to have provided a mold having a plurality of protrusions and pins as taught by JP 2001-230520 in the process of Claims 1-20 of U.S. Patent No. 6,835,580 because, Takahashi *et al.* ('972) specifically teach a desirability to form openings where said conductive bumps are present without the need of an extra step of removing resin material, hence providing for an improved process. It is submitted that said conductive bumps formed by the process of Claims 1-20 of U.S. Patent No. 6,835,580 in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) are recessed within the resulting opening because JP 2001-230520 specifically teaches making a plurality of openings and through-holes (recessed openings) at selected locations.

Further regarding claims 1-2, 9 and 24, although Claims 1-20 of U.S. Patent No. 6,835,580 in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) do not teach a removable pin, it is noted that whether said pin is fixed or removable merely providing a component that is separable rather than integral without providing any unexpected results. Therefore, it would have been obvious for one of ordinary skill in the art to provide removable

pins to the mold in the process of Claims 1-20 of U.S. Patent No. 6,835,580 in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) because of known advantages such as improved versatility, design flexibility and ease of operation and maintenance, hence providing for an improved process.

Specifically regarding claims 4 and 8, Claims 1-20 of U.S. Patent No. 6,835,580 teaches the use of bonding pads to attach conductive balls or bumps to said electronic chip and subsequently attaching solder balls to said conductive balls or bumps through said openings.

Further regarding claim 7 and in regard to claims 5, 10 and 24, Takahashi *et al.* ('972) teach that conductive bumps of a DCA device have chamfered edges and a flat surface. It is noted that JP 2001-230520 teaches protrusions that have a flat surface (see Figure 1b). Therefore, in view of Takahashi *et al.* ('972) teaching that conductive bumps of a DCA device have chamfered edges and a flat surface, it would have been obvious for one of ordinary skill in the art to have provided pins having chamfered edges and a flat surface in the process of Claims 1-20 of U.S. Patent No. 6,835,580 in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) because of the known principle that the mold surface must match the surface of the molded article, hence only pins having chamfered edges and a flat surface are able to form openings that are complementary to conductive bumps having chamfered edges and a flat surface and as such for the invention of Claims 1-20 of U.S. Patent No. 6,835,580 in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) to function as described.

In regard to claims 6 and 13, Claim 14 of U.S. Patent No. 6,835,580 teach a MOSFET device.

Art Unit: 1732

Further regarding claim 21 and, in regard to claims 11-12 and 15-16, Claim 15 of U.S. Patent No. 6,835,580 teach a flag portion.

Regarding claims 3, 14 and 22-23, Claims 1-2 of U.S. Patent No. 6,835,580 teach a nickel barrier layer.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-2, 4-13, 15-16, 21 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants' Admitted Prior Art (APA) in view of JP 2001-230520 and in further view of Takahashi *et al.* US Patent No. 5,766,972).

Applicants' Admitted Prior Art (APA) teaches a process for making a direct chip attach device (DCA) including, attaching (bonding) an electronic chip to a lead-frame structure, placing said DCA device into a mold cavity, injection molding a resin material to encapsulate said DCA device, removing said encapsulated DCA device and forming openings at selected locations to expose contact areas where solder balls are then attached (see paragraph [0008]). Further, Applicants' Admitted Prior Art (APA) teaches the use of bonding pads to attach conductive balls or bumps to said DCA (see paragraph [0002]).

Regarding claims 1-2, 7, 9, 21 and 24, Applicants' Admitted Prior Art (APA) does not teach that said mold has a blocking device, such as a pin, that contacts said conductive bump and that upon injection molding openings are formed in the encapsulating material. JP 2001-230520 teaches an injection molding process for making a plurality of openings and through-holes (recessed openings) at selected locations of a resulting molded article by using a mold having a plurality of protrusions (11) and pins (12) (see Abstract and, Figures 1b and 1c). Takahashi *et al.* ('972) teach a process for encapsulating a semiconductor device including, attaching (bonding) conductive bumps (30a) using bonding pads (31) to a chip structure (30) to form a semiconductor assembly (DCA), placing said DCA device into a mold cavity such that the top surface said conductive bumps (30a) are flush with said mold surface, applying pressure to maintain full contact at the interface between said mold and said conductive bumps (30a), injection molding a resin material to encapsulate said DCA device and also form openings where said conductive bumps are present in order for solder balls (30b) to be attached (see col. 8, line 59 through col. 9, line 48 and Figures 8-11). Therefore, in view of the teachings of Takahashi *et al.* ('972) showing a desirability to form openings where said conductive bumps are present, it would have been obvious for one of ordinary skill in the art to have provided a mold having a plurality of protrusions and pins as taught by JP 2001-230520 in the process of Applicants' Admitted Prior Art (APA) because, Takahashi *et al.* ('972) specifically teach a desirability to form openings where said conductive bumps are present without the need of an extra step of removing resin material, hence providing for an improved process. It is submitted that said conductive bumps formed by the process of Applicants' Admitted Prior Art (APA) in view of JP

2001-230520 and in further view of Takahashi *et al.* ('972) are recessed within the resulting opening because JP 2001-230520 specifically teaches making a plurality of openings and through-holes (recessed openings) at selected locations.

Further regarding claims 1-2, 9 and 24, although Applicants' Admitted Prior Art (APA) in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) do not teach a removable pin, it is noted that whether said pin is fixed or removable merely providing a component that is separable rather than integral without providing any unexpected results. Therefore, it would have been obvious for one of ordinary skill in the art to provide removable pins to the mold in the process of Applicants' Admitted Prior Art (APA) in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) because of known advantages such as improved versatility, design flexibility and ease of operation and maintenance, hence providing for an improved process.

Specifically regarding claims 4 and 8, Applicants' Admitted Prior Art (APA) teaches the use of bonding pads to attach conductive balls or bumps to said DCA device (see paragraph [0002]) and subsequently attaching solder balls to said conductive balls or bumps through said openings.

Further regarding claim 7 and in regard to claims 5, 10 and 24, Takahashi *et al.* ('972) teach that conductive bumps of a DCA device have chamfered edges and a flat surface. It is noted that JP 2001-230520 teaches protrusions that have a flat surface (see Figure 1b). Therefore, in view of Takahashi *et al.* ('972) teaching that conductive bumps of a DCA device have chamfered edges and a flat surface, it would have been obvious for one of ordinary skill in the art

to have provided pins having chamfered edges and a flat surface in the process of Applicants' Admitted Prior Art (APA) in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) because of the known principle that the mold surface must match the surface of the molded article, hence only pins having chamfered edges and a flat surface are able to form openings that are complementary to conductive bumps having chamfered edges and a flat surface and as such for the invention of Applicants' Admitted Prior Art (APA) in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) to function as described.

In regard to claims 6 and 13, although Applicants' Admitted Prior Art (APA) in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) teach a DCA device, Applicants' Admitted Prior Art (APA) in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) do not specifically teach a MOSFET device. However, it is well known that a MOSFET device is a DCA device. Therefore, it would have been obvious for one of ordinary skill in the art to have provided a MOSFET device as a DCA device in the process of Applicants' Admitted Prior Art (APA) in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) because it is known that that a MOSFET device is a DCA device, whereas Applicants' Admitted Prior Art (APA) specifically teaches a DCA device.

Further regarding claim 21 and, in regard to claims 11-12 and 15-16, although Applicants' Admitted Prior Art (APA) in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) teach a lead-frame structure, Applicants' Admitted Prior Art (APA) in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) do not specifically teach a flag portion. However, the use of a flag portion during packaging of a semiconductor device is

well known. It would have been obvious for one of ordinary skill in the art to have provided a flag portion to the DCA device obtained in the process of Applicants' Admitted Prior Art (APA) in view of JP 2001-230520 and in further view of Takahashi *et al.* ('972) because of known requirements of further attaching a microelectronic device, hence providing an improved product and also because of its known status.

Response to Arguments

8. Applicant's arguments filed January 30, 2006 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stefan Staicovici, Ph.D. whose telephone number is (571) 272-1208. The examiner can normally be reached on Monday-Friday 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael P. Colaianni, can be reached on (571) 272-1196. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

Art Unit: 1732

system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Stefan Staicovici, PhD

A handwritten signature in black ink, appearing to read 'Stefan Staicovici', written in a cursive style.

Primary Examiner

4/15/06

AU 1732

April 15, 2006